CLAIMS

1. A method of estimating the distances of the points of a map extracted from a terrain elevation database, for a mobile object subjected to dynamic constraints prohibiting it from certain zones of the map referred to as prohibited zones of passage whose configuration varies as a function of the time of travel of the mobile object; the terrain elevation database encompassing a set of points labeled by an altitude, a latitude and a longitude meshing the terrain of deployment of the mobile object; said method implementing a distance transform operating by propagation over the image constituted by the elements of the terrain elevation database corresponding to the map and arranged in rows and columns in orders of values of longitude and latitude; the distance transform estimating the distances of the various points of the image with respect to a source point placed in proximity to the mobile object, by applying, by scanning, a chamfer mask to the various points of the image; the estimation of distance of a point, by application of the chamfer mask to this point termed the goal point being performed by cataloging the various paths going from the goal point to the source point and passing through points of the neighborhood of the goal point which are covered by the chamfer mask and whose distances from the source point have been estimated previously in the course of the same scan, by determining the lengths of the various paths cataloged by summation of the distance assigned to the point of passage of the neighborhood and of its distance from the goal point, extracted from the chamfer mask, by searching for the shortest path among the paths cataloged and by adopting its length as estimate of the distance of the goal point; a distance value greater than the largest distance measurable on the image being initially allocated, at the start of the scan, to all the points of the image except to the source point,

origin of the distance measurements, to which is assigned a zero distance value; the said method being characterized in that the lengths of the paths cataloged, during the application of the chamfer mask to a goal point, with a view to searching for the shortest path, are translated into times of travel for the mobile object and in that the cataloged paths whose times of travel for the mobile object are such that the goal point would belong to a prohibited zone of passage at the moment at which the mobile object reached it, are excluded from the search for the shortest path.

2. The method as claimed in claim 1, applied to an aircraft having a vertical flight profile to be complied with determining the evolution of its instantaneous altitude, characterized in that, with the lengths of the paths cataloged during the application of the chamfer mask to a goal point, are associated the forecastable values of the instantaneous altitudes that the aircraft would have by reaching the goal point via these paths while complying with the vertical flight profile imposed, and in that the cataloged paths associated with forecastable values of altitude that are less than or equal to the goal point altitude given by the terrain elevation database and increased by a protection margin are excluded from the search for the shortest path.

3. The method as claimed in claim 2, characterized in that the distance estimation operated by propagation over the image constituted from the elements of the terrain elevation database corresponding to the map is doubled up with an estimation of the forecastable altitude of the aircraft in line with the various points of the image by assuming that it follows the shortest path selected for the distance estimation and that it complies with the vertical flight profile imposed.

4. The method as claimed in claim 3, characterized in that the altitudes of the various points of the map are subtracted from the estimates of the forecastable altitudes of the aircraft at these points to obtain deviations with respect to the ground.

5. The method as claimed in claim 4, characterized in that the deviations with respect to the ground are displayed on the map as color strata.

6. The method as claimed in claim 1, characterized in that the propagation-based distance transform scans the pixels of the image constituted from the elements of the terrain elevation database corresponding to the map, in several successive passes according to different orders.

7. The method as claimed in claim 6, characterized in that the propagation-based distance transform scans the pixels of the image constituted from the elements of the terrain elevation database corresponding to the map, in several successive passes according to different orders and repeatedly until the distance estimates obtained stabilize.

8. The method as claimed in claim 6, characterized in that the propagation-based distance transform scans the pixels of the image constituted from the elements of the terrain elevation database corresponding to the map, in several successive passes according to different orders including lexicographic order, inverse lexicographic order, transposed lexicographic order and inverse transposed lexicographic order.

9. The method as claimed in claim 6, characterized in that the propagation-based distance transform scans the pixels of the image constituted from the elements of the terrain elevation database corresponding to the map, in a series of four passes that is repeated until

stabilization of the distance estimates:

- a first pass performed row by row from top to bottom of the image, each row being traversed from left to right,
- a second pass performed row by row from bottom to top of the image, each row being traversed from right to left,
- a third pass performed column by column from left to right of the image, each column being traversed from top to bottom, and
- a fourth pass performed column by column from right to left of the image, each column being traversed from bottom to top.

10. The method as claimed in claim 6, characterized in that the propagation-based distance transform scans the pixels of the image constituted from the elements of the terrain elevation database corresponding to the map, in a series of eight passes that is repeated until stabilization of the distance estimates:

- a first pass performed row by row from top to bottom of the image, each row being traversed from left to right,
- a second pass performed row by row from bottom to top of the image, each row being traversed from right to left,
- a third pass performed column by column from left to right of the image, each column being traversed from top to bottom,
- a fourth pass performed column by column from right to left of the image, each column being traversed from bottom to top,
- a fifth pass performed row by row from top to bottom of the image, each row being traversed from right to left,
- a sixth pass performed row by row from bottom to top of the image, each row being traversed from left to right,
- a seventh pass performed column by column from

right to left of the image, each column being traversed from top to bottom, and

- an eighth pass performed column by column from left to right of the image, each column being traversed from bottom to top.

11. The method as claimed in claim 6, characterized in that the propagation-based distance transform scans the pixels of the image constituted from the elements of the terrain elevation database belonging to the map, in several successive passes according to different orders some of which consist of a scan of the image by diagonals, from one edge to the other and, within a diagonal, from one end to the other.